AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of measuring duty cycle of an interval of a signal, comprising the acts:

a) providing as an input signal repetitions of the interval of the signal;

b) making a plurality of comparisons of the value of the input signal to a threshold, each comparison being made at a controlled ~~times~~ time relative to the start of a repetition of the interval, wherein making the plurality of comparisons ~~including~~includes varying the controlled time, thereby making a plurality of comparisons at times that are coherent with the repetitions of the interval; and

c) computing a duty cycle, based on the number of comparisons having a value in a predetermined range relative to the threshold.

2. (Original) The method of claim 1 wherein the signal is a digital clock and the interval is a positive integer multiple of the period of the clock.

3. (Original) The method of claim 1 wherein the signal is a differential signal.

4. (Original) The method of claim 3 wherein the input signal is a differential signal with two legs and comparing the value of the input signal to a threshold comprises comparing the voltage difference between the legs to the threshold.

5. (Original) The method of claim 4 wherein the threshold represents the value at which the two legs have equal voltages.

6. (Original) The method of claim 1 wherein the method is performed using automatic test equipment to make the plurality of comparisons and vary the controlled time.

7. (Original) The method of claim 6 wherein making a plurality of comparisons also includes counting the number of comparisons having a value in the predetermined range relative to the threshold.

8. (Original) The method of claim 6 wherein the signal is generated by a semiconductor device under test connected to the automatic test equipment.

9. (Original) The method of claim 7 wherein making a plurality of comparisons comprises using a comparator having a strobe input.

10. (Original) The method of claim 9 wherein the automatic test equipment comprises a programmable timing generator providing a timing signal coupled to the strobe input of the comparator and varying the controlled time comprises changing the programming of the timing generator to change the time of the timing signal at the strobe input to the comparator.

11. (Currently Amended) ~~The method of claim 7~~ A method of measuring duty cycle of an interval of a signal, comprising the acts:

a) providing as an input signal repetitions of the interval of the signal;

b) making a plurality of comparisons of the value of the input signal to a threshold, each comparison being made at a controlled time relative to the start of a repetition of the interval, wherein making the plurality of comparisons includes varying the controlled time;

c) computing a duty cycle based on the number of comparisons having a value in a predetermined range relative to the threshold; and

wherein making a plurality of comparisons comprises running a test pattern a plurality of times, and varying the controlled time comprises varying the controlled time between runs of the test pattern.

12. (Currently Amended) The method of claim 11 wherein the test pattern controls ~~the tester~~ automatic test equipment to make X samples and the pattern is repeated Y times.

13. (Currently Amended) The method of claim 12 wherein the automatic test equipment makes a number of comparisons and the duty cycle is computed by dividing the number of comparisons counted by the product of X and Y.

14. (Currently Amended) ~~The method of claim 7 wherein the automatic test equipment is used in the~~A process of ~~making~~ manufacturing semiconductor devices wherein the method of measuring duty cycle of claim 11 is used to measure the duty cycles of a signals produced by semiconductor devices being manufactured and the ~~computed duty cycle is used to~~ method further comprises altering the process of ~~making~~ manufacturing semiconductor devices based on the duty cycles.

15. (Currently Amended) The method of claim 14 wherein altering the process of ~~making~~ manufacturing semiconductor devices ~~is altered by~~ comprises selecting ~~those~~ semiconductor devices having a duty cycle within a predetermined range for further processing.

16. (Currently Amended) The method of claim 14 wherein altering the process of ~~making~~ manufacturing semiconductor devices ~~is altered by~~ comprises speed binning semiconductor devices based on the duty cycle of the device.

17. (Currently Amended) The method of claim 14 wherein altering the process of ~~making~~ manufacturing semiconductor devices ~~is altered by~~ comprises adjusting parameters of fabrication equipment based on statistical properties of the measured duty cycles of the signals ~~generated~~ produced by a plurality of the semiconductor devices being manufactured.

18. (Original) The method of claim 1 wherein the controlled times are controlled so that the plurality of comparisons are made at times relative to the start of a repetition of the interval that are uniformly distributed over the duration of the interval.

19. (Currently Amended) A method of measuring duty cycle of an interval of a signal, comprising the acts:

a) providing as an input signal repetitions of the interval of the signal;

b) making a plurality of comparisons of the value of the input signal to a threshold, each comparison being made at a controlled time relative to the start of a repetition of the interval, wherein making the plurality of comparisons includes varying the controlled time;

c) computing a duty cycle based on the number of comparisons having a value in a predetermined range relative to the threshold; and

wherein ~~The method of measuring duty cycle of claim 1,~~ the method ~~being~~ is performed using automatic test equipment that can be programmed to run test patterns, the automatic test equipment having: i) a timing generator that generates strobe signals at programmable times; ii) a comparator that may be programmed to make a comparison of the value at its input to an expected value at times controlled by strobe signals from the timing generator; and iii) failure processing circuitry coupled to the output of the comparator that may be controlled to count the number of comparisons indicating that the value at the input of the comparator deviates from the expected value during a pattern[[,]];

e) wherein:

i) the act (a) comprises providing the input signal to the comparator;

ii) the act (b) comprises:

A) running a pattern with the timing generator programmed to produce strobe signals with a first time relationship to the input signal, the pattern programming the expect value of the comparator to be a value indicating that the input signal is in a first logical state;

B) at the end of the pattern, recording the count of comparisons made by the failure processing circuitry indicating that the value at the input of the comparator deviates from the expected value; and

C) iteratively altering the programming of the timing generator to produce strobe signals with a different time relationship to the input signal, re-running the pattern and recording the count of comparisons indicating that the value at the input of the comparator deviates from the expected value made by the failure processing circuitry; and

iii) the act (c) comprises computing the duty cycle of the input signal from the total number of comparisons indicating that the value at the input of the comparator deviates from the expected value made by the failure processing circuitry.

20. (Original) The method of claim 19 wherein altering the programming of the timing generator comprises incrementing by a fraction of a period of the signal the programmed time of the strobe signal.

21. (Original) The method of claim 19 wherein the strobe signals have a time relationship to the signal that causes the comparator to make multiple comparisons to the signal in each period of the signal.

22. (Currently Amended) The method of claim 1 performed using automatic test equipment programmed to measure the duty cycle of an input signal, the automatic test equipment comprising:

i) a timing generator that generates strobe signals at programmable times;

ii) a comparator having an signal input coupled to the input signal, a strobe input coupled to the timing generator, a threshold input and an digital output having a state dependent on the relative level at the signal input and the threshold input at a time dictated by the strobe input; ~~and~~

iii) failure processing circuitry coupled to the output of the comparator that may be controlled to count the number of digital outputs of the comparator indicating that the value at the input of the comparator deviates from a programmable expected value; and

iv) a software program to control the automatic test system to perform ~~a~~ the method of claim 1, wherein:

i) the act (b) comprises:

A) running a pattern with the timing generator programmed to produce strobe signals with a first time relationship to the input signal, the pattern programming the expect value of the comparator to be a value indicating that the signal is in a first logical state;

B) iteratively altering the programming of the timing generator to produce strobe signals with a different time relationship to the input signal and re-running the pattern;

ii) the act (c) comprises computing the duty cycle of the signal from one or more values counted by the failure processing circuitry indicating the total number of comparisons during all iterations of the pattern indicating that the value at the input of the comparator deviates from the programmed expected value.

23. (Original) The automatic test equipment of claim 22 wherein the comparator is a differential comparator.

24. (Original) The automatic test equipment of claim 22 additionally comprising a general purpose digital computer and the software runs on the general purpose digital computer.